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RD1-1083/23

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10 July 1961

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TO:

SUBJECT: Informal Progress Report, RD-103

This letter constitutes the Sixty-Third Monthly Report, submitted in compliance with Contract RD-103, covering the month of June, 1961.

TASK 17. TRANSMITTER RECEIVER UNITS

The RT-42 and RS-35 programs appear to be progressing satisfactorily. Barring unexpected difficulties, the delivery should be complete by the end of July, as anticipated.

TASK 19. AT-3 PREPRODUCTION ENGINEERING

The AT-3 new tape drive motor prototypes have been received from the vendor. Evaluation of these units has been started and is expected to be completed in mid-July.

TASK 20. WIDEBAND COMMUNICATIONS SYSTEM

During the reporting period, the RS-24 digital equipment has been readied for a local field test. It is hoped that such a field test will uncover the operational difficulties, allowing a more successful planning of the complete field test program. In addition, the limited results will also assist in establishing the ground rules for further work in the randomization of the digital signal.

The system planning of Tattletale "A" and "B" systems is progressing and the services of [] have been engaged to evaluate and supplement the work completed thus far.

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TASK 21. AS-6 REFURBISHMENT

No further work has been authorized under this task. As this Task Order expired at the end of June, no further progress reports will be made.

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1) Work on the [] is to be terminated. 25X1
The results and conclusions of the effort expended on this program are to be presented in a final report.

2) The scope of the [] development 25X1
is to be modified to incorporate a new system philosophy employing a non-coherent detection process. This system will hereafter be known as the [] "A" system. 25X1

3) A second transmitted reference system is to be developed, called [] "B", which will employ a wideband random carrier with random modulation. 25X1

4) Additional effort is to be expended in an attempt to further randomize the recognition and sync portions of the RS-24 digital system.

Items 2, 3, and 4 above will be prepared in the form of a proposal, as added scope to the Task.

TASK 21. AS-6 REFURBISHMENT

The AS-6 base station receiving cabinet and tape punch were shipped via commercial carrier to the [] on 10 May 1961, as per instructions. Certain subcontractor residual parts are still stored at [], and will be forwarded to the Government as soon as shipping information is available. No further work has been authorized under this Task. 25X1 25X1

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

Preparation for publication of the final report has continued throughout this reporting period. It is expected that this work will be finished during the latter part of next reporting period.

TASK 23. SERVICE AND SUPPORT

The AP-3 power supply on hand for an informal appraisal was repaired and appraisal completed. The unit did not perform satisfactorily for AT-3 use. The unit was subsequently returned to the manufacturer by [] 25X1

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desirable features not covered by the specification. Additionally, the present motor manufacturer is seriously lagging in delivery, therefore, an alternate source is desirable and will be evaluated.

TASK 20. WIDEBAND COMMUNICATIONS SYSTEM

Early in this reporting period a single sideband approach to the [] was tested. By employing coherent detection (using the same carrier for both modulating and demodulating) the system results compared favorably to base band tests. However, by substituting a separate oscillator at the same frequency for the demodulation process, the system failed to operate properly. A more detailed account of the results may be discussed during a future meeting. Currently, the alternate approaches to the [] suggested by [] are being reviewed. Our evaluations and recommendations will be transmitted by letter to [] shortly.

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Progress on the RS-24 digital system has been good and prospects have brightened. A recirculating delay line has been received and although it still does not meet specifications, it is much improved over the previous unit. Preliminary testing indicates that this line will probably suffice for the field testing operation.

TASK 21. AS-6 REFURBISHMENT

The AS-6 base station receiving cabinet is still awaiting a GBL before shipment can be made.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

Transcontinental tests involving the AS-5/[] and the AS-4/4A system in Washington were cancelled due to the heavy operational schedule being conducted by the AS-4/4A. []

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[] To simulate actual conditions, attenuators were put in series with the antenna. The tests proved that the

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Page 2 of 4TASK 19. AT-3 PREPRODUCTION ENGINEERING

All engineering has been completed for the three (3) modifications to the AT-3 transmitter production units. Final drawings have been released for implementation into the production process.

It has recently come to the attention of the Project Engineer that the type of governor used in the tape drive motor will probably not regulate the motor speed properly throughout the 200-hour period stated in the specification. Motor life tests have been started to evaluate the problem, and as yet no conclusive results have been obtained. The cognizant Government Engineer will be kept informed as to results of those tests.

TASK 20. WIDEBAND COMMUNICATIONS SYSTEM

Progress during this reporting period has been notable in that designs in nearly all of the subsystems of the receiver have been frozen. The tapped delay line investigation has achieved significant results, although additional work in tap alignment will be required in the final set-up to more closely achieve theoretical performance.

A "Q" multiplier notch filter has been constructed and tested in the receiver front end. Results were satisfactory and present effort in this area is devoted to the extension of this process to allow multiple filters to be used simultaneously.

The major area of difficulty at present is centered around the recirculating delay line. The flatness of the frequency response of the line now being tested departs markedly from specifications, thereby greatly impairing the comb filter action. Currently, a new delay line is being purchased while local efforts are directed at the development of compensating filters to even out the response of the present line.

TASK 21. AS-6 REFURBISHMENT

The AS-6 base station receiving cabinet was boxed last month and is still awaiting a GBL before shipment can be made.

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TASK 19. AT-3 PREPRODUCTION FABRICATION

A verbal go-ahead was received, authorizing the necessary design to implement three (3) modifications to the AT-3 transmitter described in the proposal submitted last month. The major portion of this work has since been completed and is rapidly being incorporated into the first production unit. This will result in a delay of the delivery of the first units. This delay has been discussed with and concurrence obtained from the Government's representative.

TASK 20. WIDEBAND COMMUNICATIONS SYSTEM

Currently the RS-24 Program may be regarded as having a balanced status. The percentage of technical completion fairly well balances the percentage of funds expended. It should be recognized that although there has been an approximate six-week slippage in the schedule of work, expenditures also have run well behind those originally forecast. As of 15 January, approximately 53% of the allocated funds had been expended.

Vendor difficulties associated with the delay lines are largely responsible for the limited progress in the delay line and associated circuitry area. At present, both tapped delay lines are being worked on in house, with promising results thus far.

An interference rejection scheme originated by an eastern company has been thoroughly investigated recently and proved to be inapplicable. The RS-24 system itself has an inherent ability to reject CW interference (20 to 30 db) in the practical case. In addition, present plans call for the mechanization of a multiple notch-filter approach to the problem of eliminating narrow band interfering signals.

TASK 21. AS-6 REFURBISHMENT

All AS-6 portable equipment and portable residual equipment has been packed and was returned to the Government on

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13 January 1961. The base station cabinet and tape punch equipment have been packed and are being held in readiness while awaiting a GBL, which is expected soon.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

During this reporting period, back-to-back AS-5 tests were successfully completed. Each system was able to transmit and receive in all modes of operation.

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It is expected that intersite tests will be concluded during the next reporting period. At that time, it is planned that one system will be shipped to a Government installation on the East Coast for the purpose of transcontinental testing.

An attempt was made to perform transcontinental testing, using CW signals,

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The purpose of this test was to help in choosing a preferred AS-5 location for the forthcoming transcontinental tests. These tests were inconclusive and should be repeated as soon as possible.

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AT-3 PRODUCTION CONTRACT 509-1528-0

The production line positions are nearing completion preparatory to full scale production. The test positions are now being evaluated using the engineering prototype transmitter. Full scale production is anticipated to begin during the first week in February, except for certain subassemblies associated with the new modifications being incorporated.

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Copy 3 of 9Page 4 of 5TASK 21. AS-6 REFURBISHMENT

All work has been completed in the refurbishment program. The customer is reportedly preparing the necessary paperwork, thereby permitting the return of all GFE property under this Task Order to the Government.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

The assembly of one (1) AS-5 system was completed and system tests have commenced. The initial test results were successful, with a great majority of the proposed modifications operating as anticipated. As a result of these tests, certain minor remaining modifications are required which will require only slight amount of reworking to render the system operational. These modifications will be completed early next month.

Construction of the second system was not completed due to slow delivery of purchased parts. A great effort, including the application of overtime, will be made during the first two weeks of next month in order to regain this lost time.

During the next reporting period an effort will be made by the contractor and Government engineers to evaluate the location of several available test sites across the country. Controlled measurements of relative signal strength will be made at each test site.

It is also expected that inter-site system testing will be started at the end of the next reporting period. The locations to be used are

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25X1AT-3 PRODUCTION CONTRACT 509-1528-0

The test specifications for production testing were revised, in accordance with factory requests.

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Other noteworthy items pertaining to the RS-24 Program are delineated below:

1. Government acceptance of the test frequencies has enabled the completion of the Field Unit r-f section.
2. A digital randomization method has been decided upon and is now being incorporated.
3. Receiving antenna bearing information has been submitted to the Government to facilitate test site selection.
4. The first quarterly report is in the rough draft editing stage and delivery is now expected to be accomplished by the middle of the next reporting period.

TASK 21. AS-6 REFURBISHMENT

In a previous report a modification to shorten the transmit cycle was suggested which was later approved, by phone. This has now been installed as a permanent change in the transmit controls section of the field unit.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

Due to delays in the delivery of purchased parts, the power supply drawers and tape transport has not been completed. It is expected that the remaining components will arrive within the next two weeks.

Testing of subassemblies has been initiated and items such as the power amplifier, exciters, power supplies, and diode read heads have been completed.

During the next reporting period, back-to-back system tests will be completed.

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TASK 21. AS-6 REFURBISHMENT

The performance of work under this Task Order has been reduced to a minimum and any remaining effort will continue on a low priority basis unless otherwise instructed by the customer.

The residual material from Project 125 has been received from [] and is in storage at contractor's facility. Other residual has not yet been received from []

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TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

Excellent progress has been made towards completion of the refurbishment of the two AS-5 systems. Major items such as the power amplifiers, exciter, exciter drawer, input/output drawers, read-head, receive drawers, and system cables have been successfully re-worked. All components necessary for the completion of this portion of the program have been ordered and no delivery problems are anticipated at this time.

During the next reporting period completion of the power supply drawers and remaining clean-up wiring will be accomplished. Individual drawer testing will be started towards the end of the month.

All wiring diagrams will be brought up to date and a wiring book will be completed during the next reporting period.

AT-3 PRODUCTION CONTRACT 509-1528-0

All drawings have now been released to the production facility and all hold orders have been rescinded.

The test specification format required by the production facility has been modified to include detailed test procedures, thereby requiring complete rewriting. Finalizing of this revised specification is anticipated in the near future.

The engineering department is providing the necessary personnel for sustaining engineering at the production facility. This effort will be particularly heavy until the first five production units have been satisfactorily completed and tested.

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SDN No. RD0-1205/23

Copy 4 of 9Page 3 of 4TASK 21 AS-6 REFURBISHMENT

During this reporting period, an evaluation of the compatibility tests conducted in August was made. A report covering this evaluation was forwarded to the customer. Recommendations for shortening the transmit cycle in order to reduce power consumption and decrease detectability were forwarded with the above report. This modification was discussed with the cognizant Government Engineer and will be installed. Repairs and adjustment of the base station long range timer are completed and instructions for its disposition are being awaited.

All recordings made by the base station, during the Spokane tests, were forwarded to the collector package vendor.

TASK 22 REFURBISHMENT OF TWO AS-5 SYSTEMS

Telephone approval for the completion of Task 22, as originally proposed, was received from [] during the current reporting period. For the past three months the effort was reduced pending a possible change in scope. The major tasks, such as modification of the exciter, power amplifier, and systems wiring, have begun. The current goal for the construction period of the refurbishment is 1 February 1961.

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AT-3 PRODUCTION CONTRACT 509-1528-0

Except for one sub-assembly, all drawings required for the production of the AT-3 have been released to the manufacturing facility, and, with one exception, the hold orders on all components have been lifted. The one exception in both cases is the dc to dc converter toroid. This contractor considers it advisable to perform one more series of tests on the latest version of the toroid before making a final decision.

The test specification that will be used by the manufacturing facility to check individual units is now in rough draft form and will be released shortly.

Copies of certain of the radiation test data are presently being prepared and will be forwarded to the customer as soon as possible, thereby enabling the production test specification to be completed.

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The Electrical Parts List (1 set of vellums and 10 copies) was delivered during this reporting period. Any changes and/or corrections will be forwarded as revisions.

During this reporting period, [] visited [] to obtain rough draft information concerning the CO-3 Coder and CA-3 Cartridge for purposes of including same in the instruction manual. Progress on the instruction manual has yielded a rough draft copy, which should be complete during the next reporting period. This copy will be submitted to the customer for approval and/or comment.

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TASK 20. WIDEBAND COMMUNICATION SYSTEM

The effort devoted to this Program has been increased considerably during this reporting period. A new and realistic schedule has been initiated, and a copy has been forwarded to the cognizant customer representative. The first system back-to-back testing is scheduled to take place during mid-January.

Several of the more critical, long lead-time items have been received and are presently being evaluated. The digital logic and module circuit design is nearly completed and fabrication will commence early in the next reporting period. The optimum 63 bit pattern has yet to be determined and is the outstanding obstacle to finalizing the pattern generators design. This will be remedied as soon as possible.

TASK 21. AS-6 REFURBISHMENT

During this reporting period, compatibility tests of the communications and collector packages were performed. The problem of premature turnoff was remedied by reinsertion of filtering at the input to the collector package. Both warm and cold tests of the field units were run locally at []. Tests with one of the two collector packages were successful, with the operational functions disabled. The premature turnoff problem was still exhibited when the other collector package was cold.

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Compatibility testing was continued with the field units

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Several problems reappeared during testing with the collector package completely operational. The most persistent of these problems was the shortening of the message section of a transmission by one or more bits. The missing information was the first part of the message. This, and other problems will be discussed in more detail in a separate report.

Despite these problems, most of the transmissions were received with excellent copy [] and most of the received messages were without error. The problems encountered indicate the need for closer technical coordination between the vendors working on this contract.

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TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

Following discussions with [] on the modification of the two AS-5 Systems for Transpond/Respond testing, work began on a formal proposal. An informal copy of the technical discussion was shipped to [] at the end of the reporting period for his evaluation and reply.

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Work is proceeding at a reduced scale on items common to the funded and proposed programs. These items include the photo diode reader, tape transport, power supplies, and synchronization circuits.

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AT-3 PRODUCTION CONTRACT 509-1528-0

A large number of the drawings required under this contract have been formally released to the manufacturing facility, and the remainder of these drawings will be released during the next reporting period.

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The electrical parts list is nearly complete in rough draft form and a copy has been forwarded to the Government's technical representative for comments.

The instruction manual is well under way and the arrangements have been made to incorporate material on the CO-3 and CA-3 units.

TASK 20. WIDE BAND COMMUNICATION SYSTEM

A condition of maximum effort towards this program has been impossible. This is partially due to priority assigned to the AT-3, AS-6, and Oblique Sounding Program. However, it is expected that with increased effort during the next reporting period, no slippage of the schedule will be incurred.

TASK 21. AS-6 REFURBISHMENT

During this reporting period, the field unit was checked out in the laboratory and the necessary repairs and improvements were made. The lack of a base station receiver prevented a complete checkout, but this was remedied as soon as the equipment was received. The compatibility testing program was delayed for a period of one week due to the above mentioned base station equipment failing to arrive on time.

At the close of this reporting period, the compatibility tests had been in progress for four days. The ever present problem of the collector package turning the field unit off as soon as high power is applied apparently still exists. However, it has been determined that the problem is definitely one of radiated R. F. and further, that the collector package actually turns off rather than simply generating a stop pulse. Effort will be conducted on an overtime basis, in order to increase the chances of a rapid solution to the problem.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

After a conference with Government personnel, it was decided that the refurbishment of the two AS-5 Systems shall proceed on a limited basis. This decision was made because it now appears

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However, delivery of these units has been suspended pending an investigation of the high level of radiated noise from the DC to DC converter sub-assembly in each unit. The source of this trouble has been traced to the toroidal transformer in the converter and, with the cooperation of the manufacturer, corrective action is now being taken. Thorough testing of each of the units will be initiated as soon as the toroidal noise radiation problem has been eliminated.

Work has been started on the electrical parts list and the instruction manual work will commence as soon as possible.

TASK 20. WIDE BAND COMMUNICATION SYSTEM

The project team is being formed and briefing sessions are scheduled to start on July 5th. It is anticipated that work will be in full swing shortly thereafter. Certain of the long lead time items have been ordered.

TASK 21. AS-6 REFURBISHMENT

The repair and checkout of the field unit is nearly complete. The servo tuning circuitry was modified to insure more reliable tuning in that the unit can no longer tune on a false null point. The remaining work comprises mainly of checking out the receiver and installation of the three ampere-hour batteries in the auxiliary power supply. It is anticipated that the unit will be ready for compatibility tests with the other contractor by July 19th. It should be noted, however, that the unit cannot be positively checked out until the necessary portions of the base station equipment are available. It is anticipated that this equipment will arrive here by July 11th, which will then allow sufficient time to complete the check-out prior to compatibility tests.

TASK 22. REFURBISHMENT OF TWO AS-5 SYSTEMS

This Task was just received during the latter part of the current reporting period, and work will start immediately. These two (2) AS-5 Systems, which were developed under Task 5, have been made available as Government furnished property for re-working under this Task.

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